REMARKS

In the Action, claims 9 and 11-14 are rejected. In response, claim 9 is amended. The pending claims in this application are claims 9 and 12-14, with claim 9 being the sole independent claim.

Claim 9 is amended to correct the clerical error noted in the Action. As amended, claim 9 is amended to overcome the rejection under 35 USC § 112, first paragraph.

In view of these amendments and the following comments, reconsideration and allowance are requested.

The Rejections

Claims 9 and 12-14 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Publication No. 2001/0046081 to Hayashi et al. in view of U.S. Patent Publication No. 2002/0131152 to Liang et al. Hayashi et al. is cited for disclosing a microcapsule composition for use in a display element. Liang et al. is cited for the position that it would have been obvious to modify the particle size distribution of Hayashi et al. in the manner of the present invention.

The present invention is directed to the discovery that a microcapsule composition comprising in combination about 30-80% by weight microcapsules where the microcapsules have a volume-average particle diameter of 30-150 microns, and not less than 80% by volume of the microcapsules being present within the particle diameter range of ±40% of the maximum peak particle diameter around the maximum peak particle diameter. These features provide improved properties that would not have been expected based on the disclosures of the prior patents. The cited patents either standing alone or in combination do

not disclose or suggest the claimed microcapsule composition having the combination of the claim features.

The Action suggests that it would have been obvious to modify the microcapsules of Hayashi et al. based on a broad general statement in Liang et al. The Action also suggests that the claimed invention is obvious because one skilled in the art is "capable" of making the modification. It is well settled law that obviousness is not established merely by one skilled in the art being capable of making a modification unless there is some teaching in the cited art or in the general knowledge of one of ordinary skill in the art to make the modification. Obviousness is established only where it would have been obvious to make the modification at the time of the invention.

Hayashi et al. relates to a thin sheet-like display which can contain a plurality of microcapsules. As noted in the Action, Hayashi et al. does not disclose the claimed weight % of microcapsules present in the composition or the claimed particle size distribution of the microcapsules. As discussed below, the combination of these claimed properties provide advantages that are not recognized in the cited patent or obvious to one of ordinary skill in the art.

With respect to the weight % of the microcapsules disclosed in Hayashi et al., the Action appears to be inconsistent. In paragraph 8, page 3 of the Action, the Examiner recognizes that Hayashi et al. does not disclose the weight % of the microcapsule composition. In paragraph 9, the Examiner indicates that Hayashi et al. disclosed "about 0.17-about 16 weight % of microcapsules" in the emulsion and refers to paragraph 0018 of Hayashi et al.. Paragraph 0018 of Hayashi et al. does not disclose the weight % of the microcapsules in the emulsion. Furthermore, applicants were unable to locate any reference to the weight % of the microcapsules in the emulsion in Hayashi et al. Applicants

respectfully request clarification as to where Hayashi et al. specifically discloses the amount of microcapsules in the emulsion.

The Action states that Hayashi et al. discloses a range of the amount of microcapsules in the emulsion and contends that it would have been obvious to increase the amount of microcapsules at least twice the amount asserted as being disclosed in Hayashi et al. up to 5 times the amount of Hayashi et al.. The Action provides no basis for the position that it would have been obvious to increase the amount of the microcapsules of 2-5 times the maximum amount indicated in the Action as allegedly being disclosed in Hayashi et al.

The Action refers to the "desired outcome of the electrophorectic display" and that one skilled in the art would readily be capable of modifying the weight % of the microcapsules to obtain "enhanced optical characteristics". This position is unsupported by the art of record or the Action. As noted above, the capability of one skilled in the art to make a modification does not necessarily render the claimed invention obvious. Furthermore, the Action has failed to establish that it would have been obvious to increase the amount of the microcapsules "to obtain enhanced optical characteristics". The art of record does not support this conclusion.

The Action relies on a general statement in MPEP §2144.05 for the misplaced position that a claimed concentration is an unpatentable difference. The cited patents provide no suggestion of the claim range. The claim range is outside the range commonly used in the art. Thus, the claimed range is not simply an optimization. Moreover, the invention is based on the combination of (1) the amount of the microcapsules and (2) the particle sized distribution. The combination of these features is not suggested in the art of record or in the knowledge of one skilled in the art. Hayashi et al. does not disclose or suggest the volume average particle diameter as recited in the claims. The rejection is based on the position that

it would have been obvious to modify the volume average particle diameter of Hayashi et al. based on the general disclosure of Liang et al. The Action relies on the passage in Liang et al. in the background section of the publication that a broad size distribution of the prior microcapsule composition results in poor resolution. Initially, it is noted that the Action takes one passage out of context and does not read Liang as a whole.

The passage of Liang refers to the prior electrophoretic displays and the various disadvantages such as sensitivity to environmental changes, poor scratch resistance due to the thin wall and large particle size of the microcapsules, the slow response time when microcapsules are embedded in a large quantity of a polymer matrix and low contrast ratio due to the low payload of the pigment particles. Liang also indicates that the prior electrophoretic displays do not enable an increase in the surface charge density of the pigment particles because of the charge controlling agents diffusing into the water/oil interface during the microencapsulation step, and the low charge density or zeta potential of the pigment particles resulting in a slow response rate. Thus, Liang points out several of the disadvantages of the electrophoretic displays containing microcapsules but does not suggest to one of ordinary skill in the art that any of these disadvantages that can be overcome simply by modifying the microcapsules as suggested in the Action.

Furthermore, the prior electrophoretic displays referred to in Liang have a microcapsule particle size and distribution that are specifically selected to obtain desired properties even though the particle size and concentration of the microcapsules may also exhibit certain disadvantages. It is well known in the art that a balance often must be weighed between the advantages and disadvantages of any component or concentration. In addition, the large particle size and the broad particle size distribution of the microcapsules referred to in Liang is a specific requirement for many electrophoretic displays to provide the

large number of pixels of the display and the precise position of the pixels. The particle size and particle size distribution referred to in Liang do not relate to properties such as contrast of the display and the damaging of the pixel by the microcapsules. Thus, the basis in the Action for the obviousness of modifying the particle size and the particle size distribution of the microcapsules as a simple solution to the disadvantages is incorrect. One skilled in the art would reasonably expect that variations from the particle size and particle size distribution referred to in Liang would not result in a desirable electrophoretic display. An increase in the microcapsule concentration of the prior devices referred to in Liang would not result in improved viewing quality as suggested in the Action. It would not have been obvious that an increase in the microcapsule concentration would result in an increased contrast and a reduction of the number of damaged or defected microcapsules as in the present invention.

Moreover, the solution to the disadvantages of the electrophoretic display devices using microcapsules proposed by Liang is not simply to modify the particle size distribution which the Action suggests would be an obvious solution to overcome the disadvantages of the prior electrophoretic displays. Instead, Liang et al. provides a solution to overcome the problems associated with the prior microcapsule compositions by forming the electrophoretic display with microcells or microcups filled with the electrophoretic solution. Thus, Liang et al. seeks to overcome the disadvantages of the prior electrophoretic displays by avoiding the use of microcapsules in their entirety and replacing the microcapsules with microcells or microcups. Liang et al. clearly provides a far more complicated solution to the problems of the prior electrophoretic displays than simply narrowing the particle size distribution as asserted in the Action. Liang et al. when viewed as a whole clearly does not provide any suggestion to one of ordinary skill in the art to modify the particle size distribution and the amount of the microcapsules in the electrophoretic display with an expectation of success.

Liang et al. does not provide a suggestion to modify the particle size or the particle size distribution of the microcapsules as asserted in the Action. Liang also does not provide any suggestion to modify the weight % of the microcapsules in combination with the size distribution of the microcapsules in the prior display devices such as that disclosed in Hayashi et al. Based on the teachings of Liang et al. as a whole, one skilled in the art would reasonably expect that the disadvantages of the prior electrophoretic displays can be overcome by a solution that is far more simple than the solution proposed by Liang et al.

Based on the disclosure of Liang et al. and the general knowledge of one of ordinary skill in the art, it would not have been obvious to modify the amount of the microcapsules in the microcapsule composition or the volume average particle diameter of Hayashi et al. in the manner of the claimed invention. Accordingly, the claims are not obvious over the combination of Hayashi et al. and Liang et al.

The Declaration previously presented demonstrates the unobvious properties and characteristics of the claimed invention. Contrary to the suggestion in the Action, the Declaration does not simply demonstrate that the invention works in the intended manner. Instead, the Declaration shows that the combination of (1) the amount of the microcapsules and (2) the volume average particle diameter of the microcapsules as recited in claim 9 are important in providing the improved properties of the microcapsule composition. The amount of the microcapsules in the microcapsule composition and the volume average particle diameter are not simply a selection of optimum values as suggested in the Action. The claimed combination provides the improved results that are not suggested in the art or record or obvious to one of ordinary skill.

The Action suggests that the Declaration is insufficient to overcome the obviousness rejection. Initially, for the reasons noted above the Action has not established

obviousness of the claimed invention since the art of record is a whole does not suggest the desirability of modifying Hayashi et al. in the manner of the claimed invention. Furthermore, the limited view in the Action of what constitutes a proper Declaration is incorrect. Applicants are not required to submit numerous examples displaying many different types of materials and particles sizes that fall within the scope of the claim. The sections in the MPEP and the cases cited in the Action do not support this conclusion. Applicants are not required to conduct numerous experiments to compare virtually every conceivable embodiment within the scope of the claims. Furthermore, the art of record does not disclose a microcapsules composition having a specified microcapsule concentration or a volume average particle diameter. Therefore, the art of record does not provide an example or range which can be directly compared with the claimed invention.

The Action suggests that the data in the Declaration should maintain the noncritical values at a constant value and vary only the properties considered critical to the invention. However, microcapsules produced according to various processes do not always have the same normal distribution. Therefore, the volume average particle diameter maximum peak particle diameter as suggested in the Action can not be maintained at a constant. Therefore, the position set forth in the Action is incorrect.

The data presented in the Declaration show that the combination of the claimed features provides properties that would not have been obvious to one of ordinary skill in the art. According to Experiment 1, the microcapsule content in the microcapsule composition is within the claimed range. However, according to Experiment 1, the volume average particle diameter of ±40% of the maximum particle diameter is 67% by weight, and thus, outside the claimed range. The data presented in Table 1 in the Declaration shows that the state of the rows the microcapsules is poor compared to the claimed invention of Example 1 - Example 4.

The data in Table 1 also show that the ratio (contrast) between reflectance is measured to be 2.6 which is a very low value compared to the microcapsule composition of the present invention. Thus, modifying the microcapsule content alone would not provide the properties of the present invention.

According to Experiment 2 in Table 1 of the Declaration the microcapsule content in the microcapsule composition is outside the claimed range. The amount of particles within the particle diameter range of ±40% of the maximum peak particle diameter of Example 2 is 85% which is within the claimed range. The data for Experiment 2 shows that the rows of the microcapsules are poor compared to the microcapsule composition of the present invention. The data also shows that the ratio (contrast) between the reflectance is evaluated at 2.5 which is a very low value compared to the value measured accordingly to the present invention. In addition, Experiment 2 was prepared according to the process where the microcapsules were dried which resulted in a very high number of damaged or defective microcapsules. Therefore, modifying the volume-average particle diameter alone would not produce the properties of the present invention.

Experiment 3 is based on the disclosure in paragraph 0176 -0178 and the examples of Hayashi et al. According to Experiment 3 the content of the microcapsule in the microcapsule composition and the amount of the particle within the particle diameter range of ±40% of the maximum peak particle diameter are outside the claimed range. Therefore, the state of rows of the microcapsule is evaluated as being very poor compared to the present invention. Furthermore, the ratio (contrast) between the reflectance is evaluated to be 1.8 which is a very low value. The number of damaged or defective microcapsule according to Experiment 3 is also very high compared to the present invention.

The data presented in the Declaration demonstrates that the concentration of the microcapsules in the microcapsule composition alone, the volume average particle diameter alone and the ratio of the microcapsules within the particle diameter range of ±40% of the maximum peak particle diameter alone do not provide the advantages of the claimed invention. The data in the Declaration specifically disclose the combination of these features as providing the improved properties.

The Action contends that it would have been obvious to narrow the particle size distribution of Hayashi et al. However, even if one were to do so, the result would not be the claimed invention. As shown in Experiment 2 in the Declaration, narrowing the particle size distribution by itself can result in a high number of defective or damaged microcapsule and does not provide the desired ratio (contrast) between the reflectance where the desired state of rows of the microcapsules according to the claimed invention. Therefore, the position in the Action that the claimed values are merely an obvious optimization is incorrect.

Paragraph 20 of the Action suggests that the physical properties would be variable depending on volume-average particle diameter and maximum peak diameter. This position is incorrect. The arrangement of the microcapsules when coated with a binder on a transparent electrode show little effect by the particle diameter of the microcapsules if the microcapsule diameter is within the claimed range. The arrangement for the microcapsules when coated would be greatly effected by the distribution of the microcapsule diameter. A very wide particle diameter distribution results in the microcapsules being destroyed by the pressure applied between electrodes when laminating as a result of the crude particles existing in a dotted state on the electrodes. A large number of small microcapsules results in the small microcapsules being oriented between the larger microcapsules. However, since the small microcapsules contact only one of the electrodes, the effect of voltage can not be

applied to the electrodes which results in the restriction of motion of the microcapsules. In addition, the small microcapsules overlapping each other result in the insufficient electrophoresis of the small microcapsules between the electrodes resulting in lowering of the display properties.

In order to solve the problems associated with the prior electrophoresis display devices, it is very important to control the amount of the microcapsules and the amount of the microcapsules within the particle diameter range of ±40% of the maximum peak particle diameter of not less than 80%. The effects of the combination of these features are demonstrated in the data presented in the Declaration. As a result of the present invention, the crude particles existing in a dotted state result in small particles that would not move between the electrodes. The overlapping particles can be reduced to a level which does not cause the problems of the prior display devices. In view of the above, Applicants respectfully submit that the physical properties would not be effected by the volume average particle diameter and the maximum peak particle diameter as suggested in the Action.

What is important in the present invention is that the amount of microcapsules existing within the particle diameter range ±40% of the maximum peak particle diameter is controlled to not less than 80% and that the microcapsule content in the microcapsule composition is within 30-80% by volume. The importance of these features is not obvious from in the art of record.

Claim 12 depends from claim 9 and recites that the microcapsules are produced in a process without drying the microcapsules. The art of record and particularly Hayashi et al. do not suggest this feature. Furthermore, the Declaration demonstrates that the drying process does not produce the same results compared to the microcapsule composition prepared without a drying process. Hayashi et al. in columns 0317-0318 disclose the

microcapsules being classified and dried to completely remove moisture. The microcapsules are then dispersed in water containing a water soluble resin or a hardenable resin. There is no suggestion in Hayashi et al. of controlling of the microcapsule content in the microcapsule composition to 30-80 weight %. Experiment 3 in the Declaration is produced according to Hayashi et al. where the drying step results in poor contrast between reflectance and an unacceptable state of rows of the microcapsules with an increased number of damaged or defective microcapsules compared to the present invention. Furthermore, the microcapsule composition of the invention produced without drying the microcapsules results in no aggregation of microcapsules and provides and electrophoretic display showing excellent displaying properties. Accordingly, claim 12 is not obvious over Hayashi et al. and Liang.

Claim 13 depends from claim 9 and recites the microcapsules being produced by wet classification step. As discussed above, Hayashi et al. and the art record as a whole does not suggest a wet classification step. Furthermore, the wet classification step of the present invention produces different results compared to the drying step of Hayashi et al. which would not have been expected by one of ordinary skill in the art. Accordingly, claim 13 is also allowable over the art of record. Claim 14 is allowable as depending from claim 9 and for further defining the effect of the amount of the microcapsules in the microcapsule composition.

Hayashi et al. is relevant to the extent that a composition is disclosed containing microcapsules having a microcapsule diameter of 10-200 microns and a shell thickness of not less than 8 microns. However, Hayashi et al. refers only to contrast, glossiness and surface roughness as the desired physical properties of the composition Hayashi et al. provides no suggestion to one skilled in the art that narrowing the particle size and the particle size distribution can provide the desired ratio (contrast) between reflectances and an improved

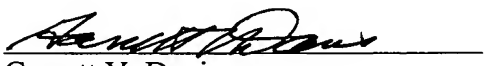
state of rows of the microcapsules with a reduced number of damaged or defective microcapsule as in the present invention.

In contrast, the present invention as defined in claim 9 provides a contrast that is remarkably increased to a size 1.7-3.4 times the contrast of the Comparative Examples such as that disclosed in Hayashi et al.. Furthermore, the number of damaged or defective microcapsules in the claimed invention is remarkably diminished to as low as one half to one sixth that of the comparative examples as shown in the Table 1 of the Declaration. The microcapsule composition of the invention provides a reduced number of damage for defective microcapsules which shows excellent physical properties that are unexpected by one of ordinary skill in the art. Nothing in the art of record or the general knowledge of one skilled in the art would expect the improved properties of the claimed microcapsule composition.

Paragraph 10 of the Action suggests that it would have been obvious to narrow the microcapsule size distribution. As disclosed on page 30, lines 5-14 of the present specification the microcapsule size distribution is controlled to form one layer and to avoid the formation of multilayer containing at least 2 layers of the microcapsules. Therefore, the Action appears to mischaracterize the meaning of the microcapsule size distribution of the present invention.

In view of these amendments and the above comments, the claims are submitted to be allowable over the art of record. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,



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